

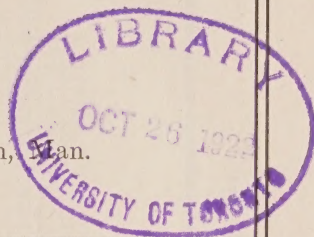
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WINTER STEER FEEDING

IN MANITOBA

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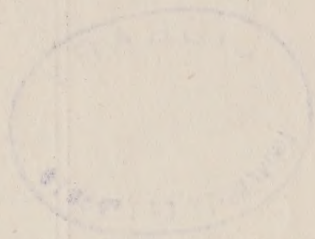
One of the best-doing steers ever fed at Brandon Farm. This steer gained 405 lbs. in 5 months or at the average rate of 2.7 lbs. per day. Picture taken in spring.

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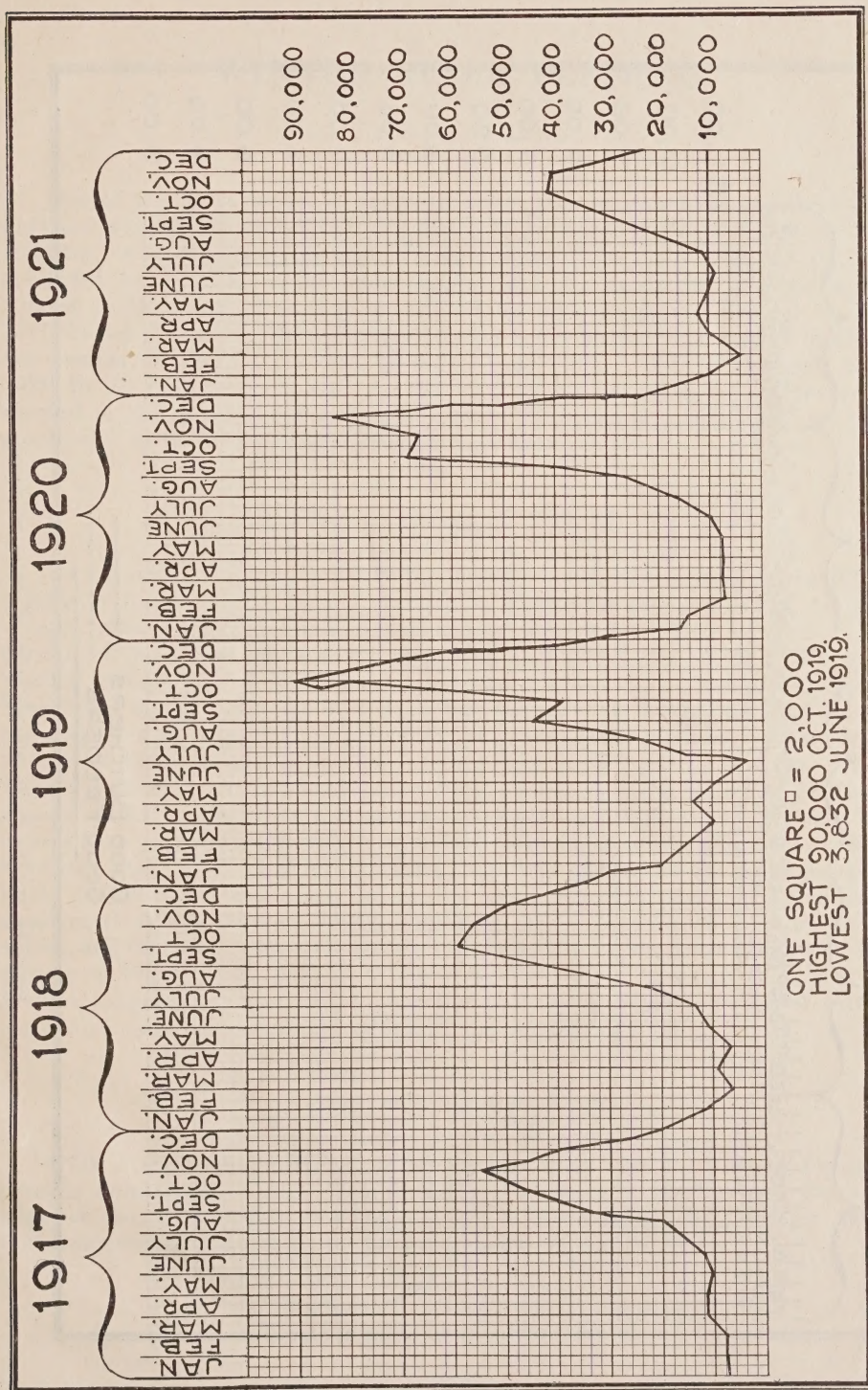
THE EXPERIMENTAL FARMS BRANCH

E. S. ARCHIBALD, B.A., B.S.A., Director

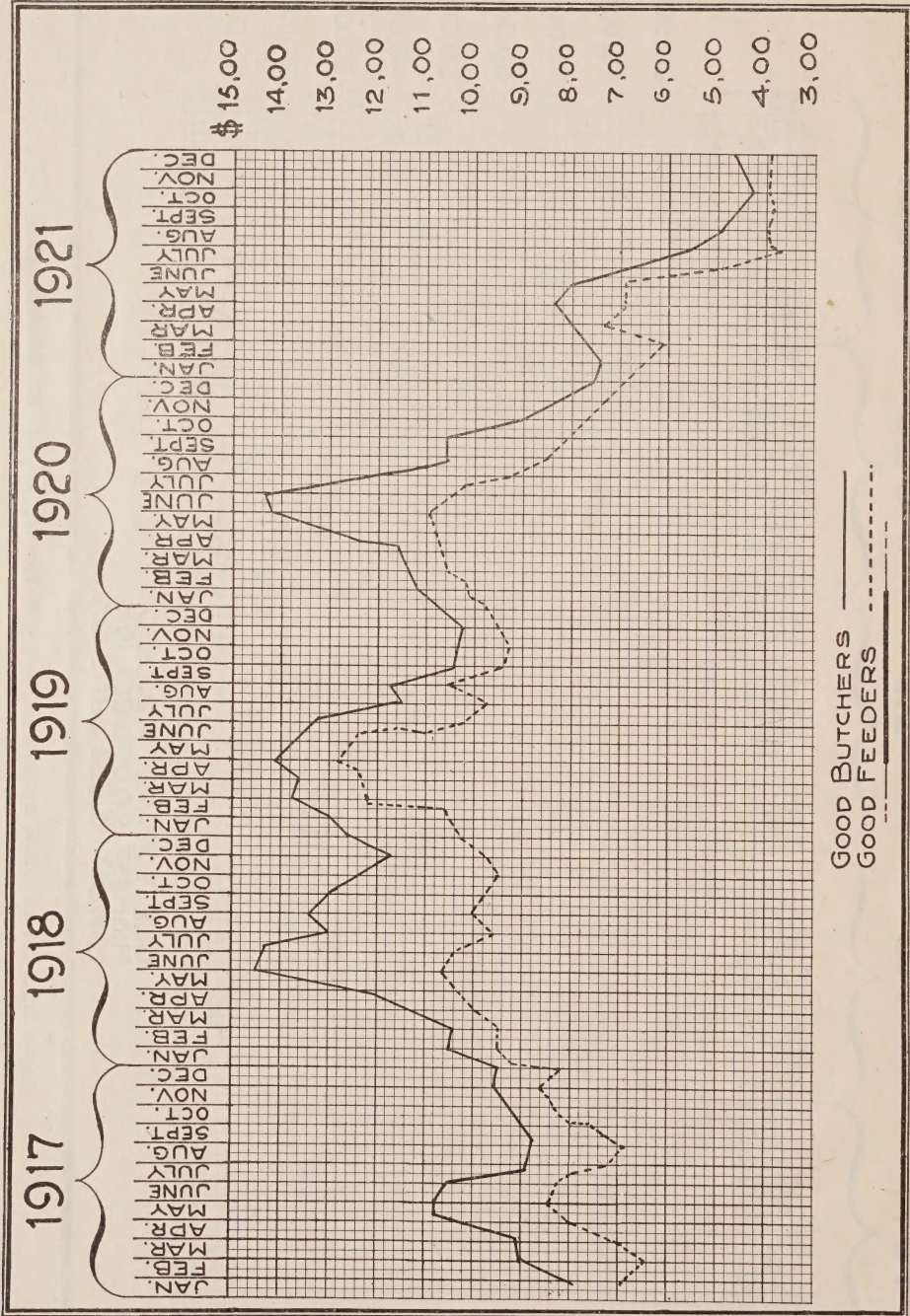
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OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922



Cattle Marketed at Union Stockyards, Sale and Through Billing, St. Boniface, Man.



Prices by Months, Cattle Market at St. Boniface Stockyards.

WINTER STEER FEEDING

One of the developments in agriculture that may reasonably be hoped for in the next few years in Manitoba and one that will be of great importance in the cattle industry, is an increase in winter steer feeding. The great bulk of the cattle marketed on the St. Boniface stock yards reach the market in the months from August to December, with October and November showing the heaviest runs. In 1917, 74 per cent of the total cattle marketed in the year were marketed in the five last months; in 1918, 74 per cent, in 1919, 73 per cent, in 1920, 79 per cent, and in 1921, 70 per cent were marketed in those months. The lowest flow of the year is reached in the months of February to June. The seasonal rise and fall are shown graphically in the first of the accompanying charts.

Effect of Marketing on Prices

As a result of this uneven marketing, prices of cattle vary greatly in the different months of the year. The second chart shows clearly the rise and fall of the prices of good butcher steers and good feeders during the five years 1917 to 1921. A comparison of these two charts shows their relation. The lowest price of the year is reached towards the last of the heavy runs of stock, and the highest price is reached towards the last of the period of light marketing. In other words, May and June are the months of peak prices, and November and December are, generally speaking, the months of lowest prices. There are natural reasons why this must be so. On the western ranges are thousands of cattle which roam the prairie fattening on the rich grasses in the summer, but finding a more precarious living in the winter. Their owners have not the feed to winter more than their breeding and immature stock, nor have they grain with which to do winter fattening, so that the yearly crop must go to the market in the fall. Also, throughout the whole prairie country there are many small cattle-raisers who are unable, or think they are unable, to feed cattle over winter, and they, too, market their output in the fall; homesteaders on uncleared land, settlers on broken land, and others, are able to pasture more cattle than they have feed, or accommodation to feed, over winter. Hence the heavy fall rush of cattle to market comes as an inevitable result of these conditions.

Marketing of Unfinished Cattle

Only a small proportion of the cattle sent to market in Western Canada is properly finished for killing. On the St. Boniface stock yards, the total steers that might be classed as finished or unfinished that were sold during the five years, 1917 to 1921, inclusive, are shown in the following table:—

**TOTAL NUMBER FINISHED STEERS AND STOCKERS AND FEEDERS SOLD ON YARDS,
UNION STOCK YARDS, ST. BONIFACE, MANITOBA**

	Heavy finished 1200	Good butchers 1000-1200	Total finished Steers	Good feeders	Fair feeders	Good stockers	Fair stockers	Total stocker and feeder steers
1917.....	12,746	33,847	46,593	20,687	5,630	31,933	15,608	73,858
1918.....	6,300	26,742	33,042	19,972	19,617	26,956	33,675	100,220
1919.....	8,958	28,743	37,701	43,463	41,986	18,523	23,774	127,746
1920.....	9,774	17,693	27,467	34,267	39,525	17,380	25,367	116,539
1921.....	13,251	15,518	28,769	24,356	20,919	8,210	7,213	60,698
Total for five years			173,572					479,061

The figures used in the above table and for the two charts on cattle marketing have been kindly supplied by Mr. D. M. Johnson, Chief of the Stock Yards Service of the Dominion Live Stock Branch.

This table shows that of the 650,000 steers marketed in these years, only a little over 26 per cent were what might be called "finished cattle," while the remainder, over 73 per cent, were stockers and feeders. Even among the 26 per cent called "finished," there is a large proportion which are only half finished, and which might very well have been fitted more highly before marketing. There is, consequently, a glut of low-grade and unfinished stuff, while the better-grade cattle are scarce. A prominent commission firm, in making a trial shipment of cattle to Great Britain, found it almost impossible to get cattle with the proper degree of finish for the British market. Many of the cattle consigned for this shipment had to be rejected on account of lack of fleshing. If Canada is to supply Great Britain with beef that will compete with what she gets from other countries, it must be fattened better before being shipped.

The fattening of beef cattle over winter would help the man who is now compelled to sell in the fall, to get a better price for his cattle, would increase the net return of the cattle business to the country by improving the grade of the stock sold, and would be a profitable undertaking for the man doing the feeding, as this bulletin will attempt to show.

Need of Mixed Farming and Place of Winter Feeding in that System

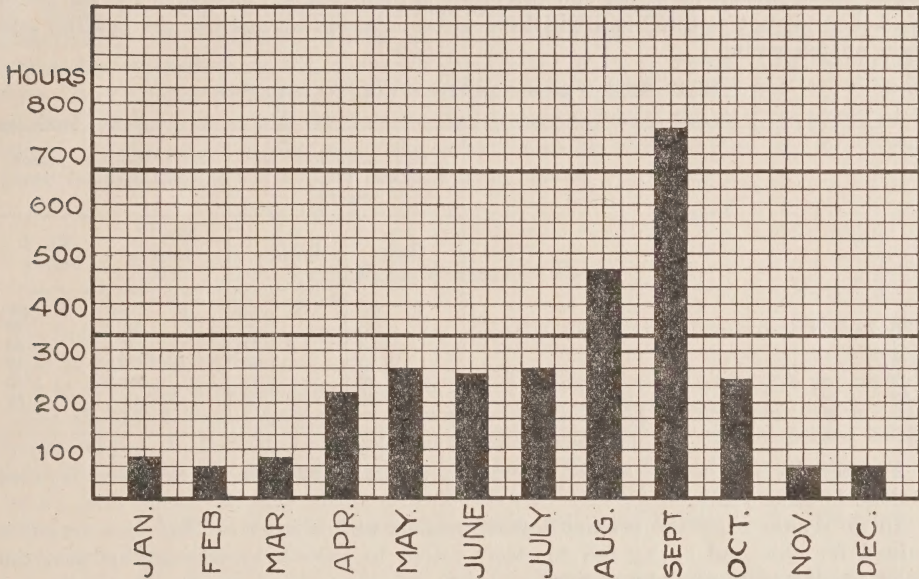
Agricultural conditions in Manitoba point to winter steer feeding as one of the best measures to bring affairs to a solid and stable basis. The one-crop, grain-growing system must be replaced by a mixed farming system in which fodder crops occupy a place as well as cash crops. Wheat growing must be balanced by production of other crops, and its production made profitable by means of soil renovation cheaper than the summer-fallow. Corn and other silage crops are coming in as summer-fallow substitutes, and clover and grasses are required to keep up the fertility of the soil and put fibre into it so that it will not blow away. These crops require cattle to convert them into marketable products, and the wheat growing of the future will need the manure of the cattle returned to the land.

The particular form that this cattle business should take will vary in different districts, and on different farms. There are places in Manitoba well suited to dairying, there are places well suited to the raising of beef cattle, there are also places where a dual-purpose type of cattle may be raised to advantage. There are also farms where the finishing of beef cattle over winter will be the most suitable project to undertake. It is not the purpose of this bulletin to deal with the kinds of farms that should be used for the various types of cattle raising, but some space must be taken to state what conditions are those which indicate that the choice should be winter steer feeding.

Who Should do Winter Feeding

Winter steer feeding fits in particularly well on the wheat farm where the land is all good, arable soil and where there are no fences. No pasture is required; therefore none of the high-priced, productive soil has to be diverted from crop production to pasturage, and no money has to be spent on building fences. Were the raising of cattle undertaken, both would be necessary.

Distribution of labour by months on average half-section wheat farm in Manitoba.



(From Manitoba Agricultural Survey, Manitoba Agricultural College.)

Winter steer feeding does not increase labour at the time of the year when the crop demands on labour are heaviest. On the wheat farm, the distribution of labour over the different months is very irregular, as is shown by the accompanying chart. Steer feeding occupies time in the winter when the labour on the wheat farm is at its lowest ebb. Often, owner's time which would otherwise be wasted can be used in this way, or, if help must be hired, for the busy season, the possibility of offering year round employment makes it possible to obtain more intelligent men than are available for short, seasonal employment.

Even the best wheat farms will soon need forage crops and manure to continue wheat growing as a profitable business. Steer feeding will accomplish this end with the least upsetting of the old routine.

Winter steer feeding is well suited to the drier districts where the growing of feed is uncertain on account of crop failure. A regular breeding herd under these conditions demands a supply of feed which may have to be bought at ruinous prices; but if winter steer feeding is followed, the number of cattle to be bought and fed may be regulated according to feed supply.

Winter steer feeding may well be added to the program on many of the farms where beef raising is already conducted, or is to be started. Wherever accommodation and feed supply permit, and the type of breeding of the cattle justifies finishing, it will pay the beef raiser to carry his project through to completion, and market his steers fat in the spring rather than to add to the glut of the partly-finished or thin stock thrown on the market in the fall.

Steer Feeding as a Means of Selling Grain

Winter steer feeding is put forward as a side line to grain growing, as a means of using straw and of marketing coarse grains as well as of returning fertility and fibre to the soil. Its success therefore will turn on how profitably it markets the grain fed to the steers. If it can be shown that grain fed to steers brings more money than it would if shipped, the strongest possible argument to the grain grower will have been presented. The steer feeding experiments at Brandon have brought out evidence on this point. In arriving at these figures, other feeds than grain are charged up at reasonable prices and the profit is then credited as return for the grain fed. Labour is not counted and will have to be balanced up against the hauling and freight on the grain.

RETURNS FROM GRAIN FED TO STEERS

Year	Price obtained per bushel fed to steers		Fort William prices on December 1st			
	Oats		Barley		No. 1 feed oats	No. 3 barley
	\$	cts.	\$	cts.	\$	cts.
1913-14.....		43		60		43
1914-15.....		83		1 17		65
1915-16.....		1 15		1 46		67
1916-17.....		1 02		1 43		1 10
1921-22.....		70		99		57

Figures for the years 1918-21, inclusive, are not available as no steer feeding was done in these years.

In no season since the present superintendent took charge in 1911 has the price obtained for oats and barley fed to steers failed to exceed, by a large margin, the regular market price of these grains.

Proof that it is Profitable

While the argument already presented goes to indicate that the feeding of steers over winter should be a profitable undertaking, that conclusion will be more positively reached if actual results showing such profits are submitted. As steer feeding has been carried on at Brandon Experimental Farm for many years, and accurate records kept of the feeds consumed, such figures are available. Granted suitable cattle for feeding, and proper care and feeding, the profit or loss on the undertaking depends on the spread between purchasing price and selling price. The following are some results obtained at Brandon that are considered typical:—

PROFITS MADE ON STEER FEEDING

Year	Spread between buying price at stockyards and selling price at stockyards	Profit or labor income per steer
1911-12.....	\$2 50 per cwt*	\$18 13
1913-14.....	1 60 " "	1 13
1914-15.....	2 75 " "	7 88
1915-16.....	2 60 " "	16 44
1916-17.....	4 10 " "	22 11
1921-22.....	3 67 " "	11 72

*1911-12 prices are based on purchase and sale at the Farm.

The cost of labour has not been counted in determining profit, and hence what is called "profit" might more correctly be called "income for labour".

It will be observed from the figures quoted that wherever a margin of $2\frac{1}{2}$ cents per pound has been obtained between the price of the feeders in the fall and selling price of the fat steers in the spring, a very satisfactory return has been obtained for the labour employed, but that where the spread dropped to 1.6 cents per pound, the profit disappeared.

The objection is sometimes raised that, if all were to go into winter steer feeding, the difference between fall and spring prices would vanish or even reverse. This is of course true, but it need not be considered very seriously by those thinking of undertaking the project. There is little likelihood of the market flow, which causes the price fluctuations, changing greatly for years to come. The ranchers produce large numbers of cattle which must go to the market in the fall and thousands of small cattle raisers will continue to find it impossible to finish their stock, so that those who can, may safely undertake winter feeding without any fear of changing the course of affairs for at least a good many years.

Kind of Steer to Feed

Success or failure in steer feeding depends very much on the selection of the type of cattle to be fed.

It is of the greatest importance to select cattle of good beef type and breeding. They should show the imprint of a sire of one of the three best beef breeds; Short-horn, Angus or Hereford. Cattle that show resemblance to dairy breeds or show lack of breeding of any kind should be avoided. They are not likely to make as good gains, and, though some do make as great gains, they will not put on the flesh in such a way as to look beefy and their appearance will cause them to be discriminated against by the buyer.

While no direct experiment on the feeding of poor types has been tried at Brandon, i.e., a lot of poor feeders to test out the point has never been bought, yet unintentionally, through having to take some poor types in other lots, an opportunity has been afforded to observe how these poor types perform on feed. Nearly always they make very poor gains. Occasionally a steer of bad type will grow rapidly and put on large gains but, even in such a case, he is not profitable as he is hard to sell, and either has to be sold at a lower rate by himself or else reduces the price of the whole lot. Only blocky, thickset steers, showing clearly beef-breed parentage, should be bought for feeding.

It is, however, quite possible to go to the extreme of selecting too good cattle, or rather to allow one's admiration for fat cattle to interfere with one's judgment as to what cattle are good feeders. In the winters of 1916-17 and 1921-22 tests were made at Brandon in which ordinary, good feeders were compared with extra choice cattle, which cost more to buy and carried considerably more fat. In both years the thinner cattle bought at feeder prices made the more profit. The figures on the steers, sold in May, 1922, were:—

	Profit per \$100 investment	Return for 100 lbs. grain fed
Good feeders.....	\$16 93	\$2 06
Extra choice steers.....	12 33	1 75

The buyer of feeders should, therefore, not compete with the buyer of cattle for immediate slaughter, except, perhaps, very rarely, on a badly glutted market when all are selling below value. In buying feeders one should not have in mind the question "which is the best bullock now," but rather "which will gain the most in the next five months and sell best at the end of that time." Given good breeding and type a moderately thin steer is a better buy for feeding than a fat one.

Perhaps the most important consideration of all in buying steers is temperament. The worst feeder one can be burdened with is the wild, nervous steer. He is always frightened of something, skulking about, starving himself, not resting properly, hard to handle and generally a source of dissatisfaction. The contented, docile animal is the one that puts on the fat and makes the profit.

Uniformity is an important consideration in buying cattle, especially if they are to be fed loose. If all are the same age and size, they live together more peaceably than if there is a mixture of large and small. It is also much easier to feed properly if all are alike and can use the same rations to advantage. Cattle of uniform size and type sell better than mixed lots.

Under present market conditions it is well to avoid buying too large steers. The home market shows a preference for what is called the handy-weight steer, meaning an animal weighing from 1,000 to 1,200 pounds. The export trade, if it is developed, may take heavy cattle as it did years ago, but at present it is too precarious and uncertain to make the heavy steer a safe proposition, so that the size that is popular for home consumption is the safest to feed. To supply this handy weight bullock, one should buy feeders weighing 800 to 900 pounds in the fall. The 1,000-pound feeder, if of first-class type, may be profitable, but that weight is the outside limit. Under 800 pounds it is hard to get feeders of the proper type; the lighter ones are likely to be weedy and of poor type and constitution.

Age

Practically all the experimental feeding work done at Brandon has been with two-year-old cattle. These, of course, are about two and a half years in the fall, and are three years old by selling time. This is the age now most generally used for feeding purposes. There are very few cattle held back to finish at over three years of age. This development is along proper lines. The feeder will find the younger stock to make more favourable gains, and the older cattle are likely to be too heavy for present market demands. In 1907, an experiment was tried at Brandon comparing two-year-old with three-year-old feeders. The two-year-olds gained 2.1 pounds per day and made \$8.99 profit per steer, as against 1.7 pounds per day gain and \$6.60 profit per steer for the older cattle.

The feeding of yearlings has not been tried out sufficiently to reach any definite conclusion. In 1904 and 1905 tests were made comparing yearlings with two-year-olds. The yearlings made slightly greater gains per day than the two-year-olds, and while the profit is reported to be greater per steer on the two-year-olds, it is found that, when it is figured on the basis of the cost of the animals, both lots made the same profit per \$100 invested. It is probable that equally as good results could be made by feeding well-grown yearling steers of good type as by feeding two-year-olds, especially where stabling is available. Whether they would do as well for outdoor feeding, present knowledge on the subject does not indicate.

Shelter

The high cost of buildings is probably the greatest obstacle to an increase in the winter feeding of cattle. If commodious, warm buildings could be erected at low cost, there can be no doubt that many more cattle would be stall-fed. However it has now been thoroughly proven that such stables are not really necessary. Admitting

that the greatest daily gains can be made in warm stables, it can also be demonstrated that very satisfactory gains can be made in the cheapest kind of shed, or even in sheltered bluffs without artificial protection of any kind. A few feeders in Manitoba have followed the method of outdoor feeding for many years, and have claimed success and good profits from their enterprise.

In 1907 an experiment was started at Brandon Experimental Farm to compare feeding without shelter, or with very limited shelter, against warm stabling. For five seasons, steers were wintered in the open with no artificial shelter of any kind. The natural shelter was a dense grove of scrub oak trees on a southern slope; a small clearing in this bush was used as feeding ground. A large rack was filled with straw, and the steers ate from it and pulled out enough to make a pile to lie on. The first year they went to a creek to drink, and the ice was cut for them once a day. Afterwards a tank heater was used in a tank of water in the open, and the water was accessible at all times. For these five seasons the average profit per steer for those fed in



Main Cattle Barn at Brandon Experimental Farm; expensive stabling such as this is not required for winter steer feeding.

this way was \$9.14, while steers cared for in a warm stable made a profit of \$11.52. These figures do not cover interest on equipment, nor labour. They are based on gains made on the value of the feeds used. The average daily gain in weight for the steers fed outdoors was 1.21 pounds, as compared with 1.39 pounds for those fed inside. It will therefore be seen that, while the gains made by the former were smaller, they were within reasonable distance of being as good as those under what would be considered ideal conditions. The quantities of feed used by the outside lots were larger, and hence the profit figuring on feed alone, was smaller. It was, however, a satisfactory profit considering the low prices prevailing at that time, and the very cheap equipment.

In 1914 the corral and shed shown in the accompanying illustration were built. The shed consists of a wall of one ply of shiplap on the back and two sides, and a roof of poles and straw. The front, which faces the south, is entirely open. The corral has a high board fence on east and west, with gates in the front. A division up the

centre divides both into two feeding yards. Racks for straw are built against the outside walls, and troughs for other feed against the central division. The cost was very small. During the winters of 1914-15, 1917-18, and 1921-22, steers were fed in this shed with very good results. In each case profits were made, small in the first season, but very satisfactory in the last two. The average gain in weight per steer per day during these seasons was 1.64 pounds. There is no direct comparison with stall-fed steers, as in two of the seasons mentioned only outdoor feeding was done, while in 1915-16, 1916-17, and 1919-20 only inside feeding was tried; however, the average gain in the four seasons of indoor feeding, which was 1.58 pounds per day, forms more or less of an indirect comparison, and at least justifies the inference that the steers fed in the shed did not suffer any very great hardship. Probably larger gains from the same amount of feed can be made in a warm stable. It is not



For five winters, steers were fed at Brandon with no more shelter than that provided by the trees shown in this picture.

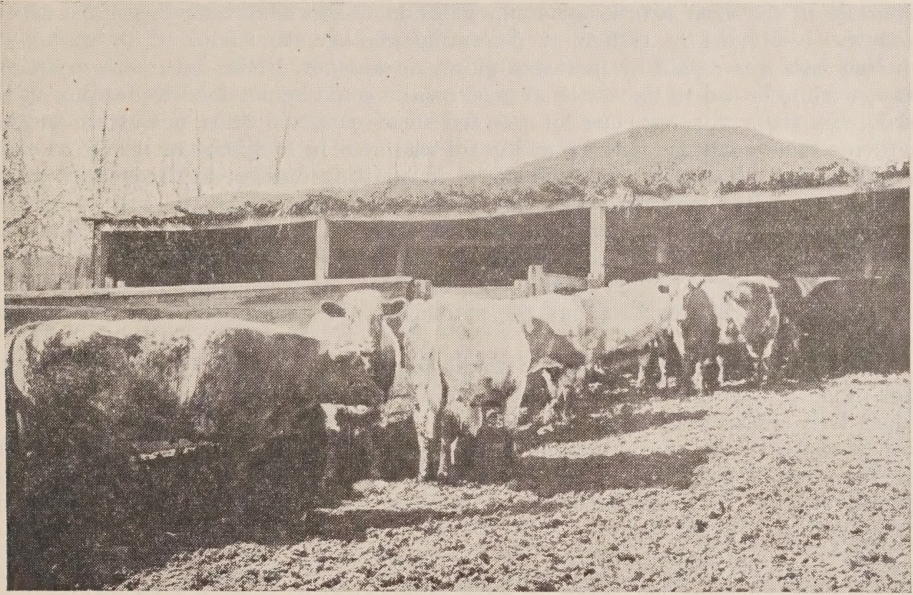
suggested that any one should adopt lack of shelter by preference. But these experiments do show that good results can be obtained with shelter of the most primitive sort.

Some of the points in regard to open shed feeding that experience has brought out may perhaps be mentioned here. Windbreaks are most important; if natural shelters in the form of trees or cutbanks can be found they should be utilized. A high, tight-board fence should surround the feed yard if it is exposed to wind.

A dry bed, free from frozen lumps of manure, should be provided. If a steer is to fatten he must lie down and rest; if his bed is all frozen lumps he cannot lie down in comfort, and so remains standing. The frozen lumps of manure should be thrown out of the shed daily. The bedding should be renewed sufficiently often to keep it from getting damp.

A supply of water before the cattle is worth a great deal. A large, flat-bottomed drinking tank and a tank heater in it form the necessary equipment for this. The fuel required for a tank heater is very little. This procedure will allow the cattle to drink all they require, which means better gains; it will also permit of their drinking lukewarm water, which assists very materially in keeping them comfortable in cold weather.

The most frequent cause of discomfort in outdoor feeding is the collection of snow on the steers' backs. This melts gradually and keeps them chilled. Most of the stock will remain in the shed during a snowstorm, but there are nearly always some that stand outside and get their backs covered. If they are tame enough to be approached, it is worth while to brush the snow off.



Shed and Corral divided into two yards for experimental feeding at Brandon Experimental Farm.

Feeding

Steer feeding in Manitoba will take its place largely as a side-line to grain growing. The object of the operation in most cases will be to convert home-grown feed to profitable uses. This feed will be straw which might otherwise be burned, coarse or low grade grains that would otherwise be sold at less profit and such other fodders as are grown for their effect in improving the farming system so that grain may be grown more profitably. The choice of feeds is therefore much different from what it would be to the person who proposes to buy feeds in the open market. The problem is one of the utilization of what is already grown and of such additions to the farm crops as can conveniently be brought in without upsetting the farm system, rather than one of a wide choice of possible feeds to purchase.

Roughages

Under these circumstances straw will be the basic roughage used and the standard by which other coarse fodders will be judged. In the first place it may be said that it is quite possible to conduct successful and profitable steer feeding operations with no other roughage than oat or barley straw. Experiments have been conducted repeatedly at Brandon where one of the lots under test received only straw and a grain ration. While usually the other lot with a more varied or higher-grade ration did better than that on straw, nevertheless the results with straw showed that satisfactory gains can be made and in some instances better profits were made with it than with higher-priced feeds. So that while it certainly is advantageous to have other roughages, the lack of them need not prevent successful steer feeding. Straw

for feeding should be oat or barley straw. Wheat, rye, or flax straw is not so nutritious.

Sheaf oats, next to straw, is perhaps the commonest farm feed. For fattening steers over winter, oats cut on the green side form an excellent fodder. Experiments conducted in several different seasons with sheaf oats as the main fodder have given good results. Comparisons with native hay and with dry cornstalks came out to the advantage of the sheaf oats so far as the gains in weight were concerned. An experiment was conducted in 1916-17 to determine whether the labour of threshing and grinding oats was repaid by increased gains, or whether, if the oats, both grain and straw, were to be fed to the cattle, as good results could be obtained by feeding in the sheaf. To make this test, one lot was fed sheaf oats, the other cut straw and oat chop; the same quantity of straw and grain was used in each case as nearly as could be determined. Both lots got some shorts in addition during the latter part of the period. The gains in weight were practically alike, but where the cost of putting on a pound gain with the cut straw and chop was 10.2 cents, it was only 6.9 cents with the oat sheaves. This experiment has not been repeated and it would perhaps be a mistake to lay too much emphasis on one test. It may be safely said, however, and general experience bears out the statement, that sheaf oats are an excellent feed.

Wild hay is sometimes used for roughage. It is extremely variable in quality. High-grade prairie wool free from weeds is a first-class feed, but under present conditions it is almost never seen in Manitoba. Slough hay varies in quality, and it is hard to express any definite opinion about it. However where a farmer has a considerable area of good hay sloughs, he can certainly use the hay to good advantage in steer feeding. It is much more nutritious than straw, and fattening can be accomplished with it with smaller grain rations than are needed with straw.

Hay of tame grasses such as timothy, western rye grass, and brome grass is higher in quality, on the average, than wild hay and it goes without saying that it is well suited to steer feeding. Clover hays are better still; alfalfa in particular has a very high nutritive value. Experiments conducted at Brandon have shown that alfalfa can replace from one quarter to one-half of the grain ration, pound for pound, without any appreciable loss in the gains made by the stock. Sweet clover is also a nutritious feed, though the percentage of waste is much higher on account of the coarse stems.

Where there are two grades of coarse fodder to be used in fattening a lot of steers over winter it is advantageous that the poorer be used up first. For instance, if a man has some straw and some hay, it is better to have the steers use the straw up in the earlier part of the winter when the grain ration is smaller and they are more willing to eat roughage. Then, when they are given hay, they will take to it with relish and do well. But if the hay is used first, they are unwilling to turn to straw, and if they are getting a good grain ration will try to live on it, with disastrous results.

Cornstalks can be used satisfactorily in feeding steers. They are not, of course, as nutritious as good hay, but they are more cheaply grown, and the yield per acre is much higher, so that they form a cheap and useful feed. Where the farmer does not feel justified in building a silo, but can grow corn successfully, the dry stalks fed to steers will make a good return for his labour. If they are cut up they are eaten more economically than if they are fed long.

Wherever the feeder finds it practicable to build a silo or dig a pit silo, corn ensilage will prove itself a means of reducing the cost of steer feeding. The palatability of the succulent feed has an effect on digestion that makes more economical gains. In 1913-14, in a test at Brandon, steers fed dry corn fodder made an average gain per day of 1.44 pounds, while those fed corn silage gained 1.88 pounds per day. The cost of feed for making a pound gain was 10.02 cents where dry fodder was used, and 7.70 cents where ensilage was used.

Sunflowers may also be used for silage. Tests in 1920-21 and 1921-22 at Brandon have shown sunflower silage to have a feeding value not very much below corn silage.

As sunflowers will outyield corn and will stand more frost and drought they should extend the silo area into new districts.

The quantities of fodder given should fit the steers' appetite. Straw, of course, is usually fed in bulk, and the stock allowed to pick it over. Other, more valuable, fodders may better be handled more economically, giving the cattle only what they will clean up. Thirty pounds per day is a good allowance of silage for beef cattle.

As has been said in the introduction of this phase of the subject, the choice of coarse fodders in steer feeding is largely one of availability. Any of the fodders in use in the west can be fed with good results if they are used sensibly and if they are produced or obtained cheaply. It is, however, well worth while to endeavour to have some of the higher grade fodders such as alfalfa or tame grass hays, especially for finishing off in the spring. And, considering the great value of corn in the rotation it may be worked in to the feeding system with advantage to both farm and feeding results.

Grain Ration

In choosing the grain ration for steers, availability and cost are the main considerations. Any of our common grains may be fed, at least as part of the ration. The feeding of all oats or bran would make too light a ration, and all wheat or rye too heavy a one, but any reasonable combination of common grains may be used successfully. Equal parts of barley and oat chop is perhaps the standard ration and it is a hard one to beat. Low grade wheat, rye or good wheat screenings may replace the barley if more available, or bran may replace the oats.

Where grain has to be purchased for steer feeding, recleaned wheat screenings have been for a good many years the cheapest feed that could be bought. This feed is a by-product of the terminal elevators, and is the screenings from wheat, with the small, objectionable seeds removed. It consists chiefly of broken and shrunken wheat and wild buckwheat, with smaller amounts of wild oats, flax, other grains, and a little chaff. In tests at Brandon in 1920, a mixture of ground screenings and bran gave better results for steer feeding than oats did. In purchasing feed of this kind one must be careful to make sure that it is recleaned and the small seeds such as mustards, stinkweed and pigweed all taken out, as they are useless for feed and some are harmful.

The quantity of grain to feed will depend on the character of the coarse fodder, the size of the cattle, and the time allowed for fattening them. At Brandon, when feeding with straw alone, steers have been started with 4 pounds of grain about December 1, and gradually increased to 12 or 14 pounds by March 1 to 15. Increases are made 2 pounds at a time and usually about two weeks apart. When the roughage includes silage and there is some hay to finish off with, they are started with only 2 pounds of grain per day and finished without going over 8 to 10 pounds per day. Increases should always be gradual. The condition of the steers should be watched and the grain feed fitted to the way they are coming on, so as to keep them gaining steadily and to have them fit to sell by the date at which it is planned to market them.

Dehorning—Loose Box Feeding

For many years all steers fed on the Brandon Farm have been dehorned. There has never been a death from this operation. Only one serious case of bleeding has occurred during the present superintendent's experience; it was successfully stopped, and the animal made good gains afterwards. Experiments conducted in the early years of the Farm showed conclusively that animals fed in loose boxes did much better than animals tied up. To feed successfully in either box stalls or open corrals, dehorning is absolutely essential. In 1909 a lot of horned, tied cattle made a profit of \$5.79 per steer, while dehorned, loose cattle made \$10.45 per steer. Other tests have given similar results.

A load of dehorned cattle sells better on the market than a load with some or all of the cattle with horns on.

